TWO NEW MOLLUSKS OF THE GENERA OSTREA AND EXOGYRA FROM THE AUSTIN CHALK, TEXAS

By Lloyd W. Stephenson
Of the United States Geological Survey

Two new species of Ostreidae recently found in the upper part of the Austin chalk of central Texas are of interest because of their restricted stratigraphic range, their known geographic range along linear distances respectively of 50 and 75 miles, and the great number of individuals representing each species. One of them, *Ostrea centerensis*, has been found at five localities along a line of outcrop 50 miles long, extending from Travis to Bell County, in a stratum a foot or less in thickness, which, on Little Walnut Creek in Travis County, lies about 25 feet below the top of the Austin chalk. The other species, *Exogyra tigrina*, occurs at its type locality on Little Walnut Creek in Travis County, in a stratum of chalky marl a foot or less in thickness, 35 feet below the top of the Austin chalk, 10 feet below the zone of *Ostrea centerensis*, and has been found at 5 other localities, two of them farther south in Travis County, and three toward the north, the most distant one being northeast of Temple in Bell County. The linear distance along which this species has been collected is 75 miles.

The species, *Exogyra tigrina*, is of especial interest because the original color markings of the shell are still well preserved. This, however, is not the first recorded species of this genus which exhibits color markings, for similar markings appear on an *Exogyra* from the upper Cenomanian and the lower Turonian of Europe, which Coquand [1] in 1869 figured under the name *Ostrea columba*, and described in the text under the name *Ostrea ratisbonensis*. He says: "La surface, dans les exemplaires bien conservés, est couverte de flammules brunes, obliques, en sautoir." The color markings on this species, as represented in Plate 45, Figures 8 and 9, of the paper cited, are very similar in character and distribution to those on *Exogyra tigrina*.

[1] Coquand, H., Monographie du Genre Ostrea, Terrain Crétacé, p. 121, pl. 45, figs. 8–12, 1869.

The section on Little Walnut Creek described below shows the stratigraphic position of each of the new species; the section was not accurately measured and the thicknesses given are only approximately correct.

Section on Little Walnut Creek in the vicinity of the iron bridge at the crossing of the old Sprinkle road, Travis County

	Feet
Taylor marl:	
Marly clay, poorly exposed	10
Unconformity?	
Austin chalk:	
Alternating layers of rather massive marly chalk and harder chalk; contains *Exogyra ponderosa* var. *erraticostata* Stephenson, and *Ostrea* species (aff. *O. diluviana* Linnaeus) within 10 feet of top	20
Rather soft argillaceous, marly chalk; a one-foot layer, 5 feet below the top contains many specimens of the new oyster, *Ostrea centerensis* Stephenson	15
Massive chalk with several softer marly layers; the upper one foot of chalk contains great numbers of the new oyster, *Exogyra tigrina* Stephenson, and just below this is a layer containing many shells of *Exogyra laeviuscula* Roemer (a varietal form); *Exogyra ponderosa* Roemer occurs in the lower part of the section	15

The type locality of *Ostrea centerensis* is a ravine north of the public road, 2¾ miles west-northwest of Sparks, ⅝ mile north of Center Lake School, Bell County. In this ravine marly chalk, exposed downstream for about 100 yards, contains considerable numbers of this new oyster; the marly bed ends against a small fault whose downthrow is toward the road, and a chalk bed exposed on the north or upthrow side of the fault contains the shells of *Exogyra tigrina* Stephenson. Doubtless the latter bed belongs stratigraphically below the former, as it does in the section on Walnut Creek.

The photographs (pls. 1–3) were made by W. O. Hazard, in the photographic laboratory of the United States Geological Survey, and were retouched by Frances Wieser, also of the Geological Survey.

OSTREA CENTERENSIS, new species

Plates 1 and 2

Description.—Shell of medium size, inequivalve, subovate somewhat elongate in outline, generally curving more or less strongly backward, though nearly straight in some individuals; valves flattish, close-fitting with little room for the soft parts when tightly closed; shell wall thin to moderately thick, but tough and strong; the shell shows a tendency to the development of wing-like anterior and posterior projections in the dorsal portion, but this is a variable feature. Dimensions of the type, a nearly complete individual with both valves preserved: Length 70 mm., height 68 mm., thickness 12 mm. Dimensions of a large left valve (pl. 2, figs. 1, 2): Length 83 mm., height 85 mm., convexity 10 mm.

Beaks relatively small, projecting slightly above the hinge, generally curved over to the left from the plane of contact of the two valves.

Left valve flattish to slightly convex, smooth, with the exception of fine growth lines, some stronger growth lamellae, and irregularities due to crowding; scar of attachment relatively small, the oyster showing a decided preference for attachment to the shells of an elongated mollusk, probably *Gervilliopsis;* margins overlapping the margins of the right valve.

Right valve smaller, flatter, and smoother than the left valve, and wing projections less pronounced.

Hinge triangular, the base a little longer than the sides; ligamental groove more deeply impressed on the left than on the right valve; adductor scars of moderate size, situated high, and toward the posterior margin of the shell; a small pedal muscle scar is just below the lower end of the ligamental groove; on some specimens irregular striations appear on the inner surface where the upper ends of the posterior and anterior margins of the right valve fit against the left valve just below the hinge.

Remarks.—This species is unique among the many oysters in the Cretaceous deposits of the Atlantic and Gulf Coastal Plain. Though simple, plain, and of moderate size, it presents characters which unmistakably distinguish it from all other species. It has been found only in one zone a foot or two in thickness, along a linear distance of nearly 50 miles. It appears to have no ancestors in the older Cretaceous deposits of the Coastal Plain and, so far as known, it left no descendants. It appeared suddenly in an environment that was evidently favorable, for the individual shells are numerous. It remained only for a moment (in a geologic sense), and for some unknown reason disappeared as suddenly as it had come. The most probable fatherland for the immigrant stranger is perhaps the tropical seas of the Caribbean region, the Cretaceous history of which is imperfectly known. If this be true, the cause of the appearance and disappearance of the species might be surmised to have been a temporary warming up of the waters of the Gulf region, followed by a cooling off of the waters to a degree unfavorable to the survival of the young oysters.

Types.—Holotype: Cat. No. 73657, U.S.N.M., from a ravine 2¾ miles west-northwest of Sparks, Bell County. (See below.)

Paratypes: Cat. No. 73658, U.S.N.M., from Cottonwood Creek, 2.7 miles north-northwest of Hutto, Williamson County; Cat. No. 73659, U.S.N.M., from Little Walnut Creek, 2¼ miles southwest of Sprinkle, Travis County. (See below.)

Distribution.—Upper part of Austin chalk: On the downthrow side of a small fault, in a ravine 2¾ miles west-northwest of Sparks,

⅝ mile north of Center Lake School, Bell County (U. S. G. S. Coll. 14074); Cottonwood Creek, 2.7 miles north-northwest of Hutto, 2 miles west-southwest of Montadale, Williamson County (U. S. G. S. Coll. No. 14072); near top of hill west of F. V. Browning's ranch house, 3.1 miles south by east of Hutto, Williamson County (U. S. G. S. Coll. 14071); 25 feet below top of Austin chalk, on Little Walnut Creek, 2¼ miles southwest of Sprinkle, 0.2 mile downstream from the iron bridge of the old Sprinkle road crossing, Travis County (U. S. G. S. Coll. No. 14163).

In addition to the localities just enumerated, where collections were made, this oyster was observed in a branch east of the public road, 1.5 miles south of Jonah, Williamson County.

EXOGYRA TIGRINA, new species

Plate 3

Description.—Shell small for the genus, inequivalve, broadly subovate in outline; shell wall of moderate thickness. Dimensions of the holotype: Length 56 mm., height 53 mm., thickness 31 mm.

Left or lower valve much larger than the right, strongly convex, attached at the tip of the beak where only a very small scar of attachment is present on most specimens. The valve is rather openly spiral, attaining about 2½ volutions in the holotype. Umbonal ridge pronounced, round-crested, sloping steeply on either side, curved to conform to the spiral twist of the shell. Hinge narrow and curved in the manner normal to the genus; ligamental groove narrow, deeply impressed. Adductor scar of medium size, situated a little above the midheight and toward the rear.

Surface of left valve smooth for several millimeters back from the beak, beyond which it is ornamented with irregular, round-crested costae of weak to moderate strength; these bifurcate frequently on the umbonal ridge, and less frequently on the slopes; about the outer half of the surface of the larger individuals is modified by the more or less prominent development of concentric, imbricating growth lamellae which at their intersections with the costae expand outward in spinelike folds 1 or 2 millimeters high; these folds vary in prominence and are easily broken, none of them being perfectly preserved. The surface is further marked by brownish, radiating color bands, which alternate with gray bands; their distribution is similar to that of the costae on the posterior slopes of which they are chiefly developed; however, they sometimes occupy the interspaces or the crests of the costae; their distribution was apparently controlled by the costae. This is one of the rare cases

in which the color markings of the living shell are preserved in the fossil state. These color markings are present on most of the specimens collected from the six localities, their apparent absence on some individuals being due to weathering and leaching.

Upper or right valve flatly spiral, operculiform, slightly convex anteriorly, becoming concave posteriorly, fitting neatly within the margins of the left valve. Surface ornamented with numerous sharp-edged lamellae, separated by deep depressions, which are closely spaced on the anterior part of the shell, and more widely spaced posteriorly; on the type there is also an insipient development of irregular costae which produce the same sort of spinelike folds where they cross the concentric lamellae, as are present on the left valve, but costae are absent on some specimens; color bands are wanting on the right valve. Ligamental groove narrow and deeply impressed.

Remarks.—This species is about the same size and has about the same general form as *Exogyra laeviuscula* Roemer, an upper Austin chalk species. Roemer's species is smooth, with no indication whatever of radiating costae, and is entirely wanting in color bands; it is also broader in the umbonal region, has a less prominent and more rounded umbonal ridge, and is not quite so openly coiled.

Like most other oysters this species varies considerably in outline and form and in the coarseness of the costae. In some individuals the costae are considerably finer than they are in the type.

So far as known the species is confined to a zone only a foot or two in thickness. It was first collected in 1894 by Dr. Robert T. Hill at the two localities (see below) which are south of Colorado River, in Travis County.

Type.—Cat. No. 73660, U.S.N.M. From Little Walnut Creek, 2¼ miles southwest of Sprinkle, Travis County. (See below.)

Distribution.—Upper part of Austin chalk: Onion Creek, half a mile above Bluff Springs, Travis County (Hill Coll. No. 54, U.S.N.M.); Williamson Creek between the upper and lower Lockhart road crossings, Travis County (Hill Coll. No. 51, U.S.N.M.); Little Walnut Creek, 0.2 mile downstream from the iron bridge of the old Sprinkle road crossing, 35 feet below top of Austin chalk, 2¼ miles southwest of Sprinkle, Travis County (U. S. G. S. Coll. 14164); public road, 1.2 miles south of Jonah, Williamson County (U. S. G. S. Coll. 13809); on the upthrow side of a small fault, in ravine 2¾ miles west-northwest of Sparks, ⅝ mile north of Center Lake School, Bell County (U. S. G. S. Coll. 14073); Little Elm Creek, 2.4 miles northeast of Temple, Bell County (U. S. G. S. Coll. 13822).

EXPLANATION OF PLATES

[All figures natural size]

PLATE 1

Ostrea centerensis Stephenson (p. 2)

Figure 1. Exterior of the left valve of the type. Cat. No. 73657, U.S.N.M.
2. Exterior of the right valve of the type, showing also overlapping margins of the left valve.
3. Interior of a right valve from Cottonwood Creek, 2.7 miles north-northwest of Hutto, Williamson County. Cat. No. 73658, U.S.N.M.

PLATE 2

Ostrea centerensis Stephenson (p. 2)

Figure 1. Exterior of a large left valve from Little Walnut Creek, 2¼ miles southwest of Sprinkle, Travis County, showing its scar of attachment to an elongated pelecypod shell. Cat. No. 73659, U.S.N.M.
2. Interior of the same left valve.
3. Front edge view of the type (Cat. No. 73657 U.S.N.M.), showing the thickness of the shell with the two valves tightly closed.

PLATE 3

Exogyra tigrina Stephenson (p. 4)

Figure 1. Exterior of the left valve of the type, showing the original color markings. Cat. No. 73660, U.S.N.M.
2. The same, photographed after coating with ammonia chloride to cover up color markings, and bring out the true sculpture.
3. Edge view of the same showing thickness and color markings.
4. Interior of the same.
5. Exterior of the right valve of the type, showing the overlapping margins of the left valve.
6. Interior of the right valve of the type.

U. S. GOVERNMENT PRINTING OFFICE: 1929